S
352.38213
ALRIPP
1976 V. 2
1

ADMINISTRATION·EDUCATION·ENVIRONMENTAL
MANAGEMENT·HUMA

State of Montana

Long Range
Information Processing
Plan – Phase I

Volume 2

December, 1976

STATE DOCUMENTS COLLECTION
[illegible]
MONTANA STATE LIBRARY
[illegible]

Montana State Library
3 0864 1003 7748 3

REPORT ON PHASE I

Development of a Statewide,
Long-Range Information Processing Plan

TABLE OF CONTENTS

VOLUME 1

Chapter Page

1. Executive Summary

1.1 Scope of the Plan....................................1-1
1.2 Phase I Recommendations....................................1-5

2. Justification and Background for Statewide Plan

2.1 Historical Perspective....................................2-1
2.2 Data Processing Today....................................2-7
2.3 Need for a Plan....................................2-11
2.4 Scope and Study Limitations....................................2-21
2.5 Study Approach....................................2-23

3. Organization

3.1 Introduction....................................3-1
3.2 Organizational Objectives....................................3-3
3.3 Organizational Alternatives....................................3-5
3.4 Assignment of Responsibilities....................................3-7
3.5 Organization Structure....................................3-11
3.6 Policies and Guidelines....................................3-19
EXHIBIT I....................................3-21
EXHIBIT II....................................3-23

4. Planning and Controlling Statewide Information Processing Resources

4.1 Introduction....................................4-1
4.2 Biennial Planning Process....................................4-3
4.3 Continuous Planning Process....................................4-17
4.4 System Development Project Planning and Control..........4-19
4.5 A Mechanism to Set Priorities....................................4-27
4.6 Relating the Planning Processes to the Statewide Organizational Structure....................................4-33
EXHIBIT III....................................4-35
EXHIBIT IV....................................4-37
EXHIBIT V....................................4-39

VOLUME 1 (continued)

Chapter Page

5. Phase I Recommendations

5.1 Introduction....................5-1
5.2 Positioning Recommendations....................5-3
5.3 Critical Issue Recommendations....................5-9
5.4 Completing the Detail Plan....................5-15
5.5 Related Recommendations....................5-17

6. Requirements for Phase II

EXHIBIT VI....................6-2
EXHIBIT VII....................6-3

VOLUME 2

Appendix I Inventory of Existing Resources

Appendix II Inventory of Key Applications

Appendix III Systems Development Project Planning Process

EXHIBIT VIII....................14
EXHIBIT IX....................16
EXHIBIT X....................18
EXHIBIT XI....................20
EXHIBIT XII....................22

APPENDIX I INVENTORY OF EXISTING RESOURCES

INVENTORY OF EXISTING RESOURCES

Introduction

This Appendix presents an inventory of information processing resources and costs. The Appendix is presented in the following successive levels of detail:

1. The 1976-77 Information Processing Resources Cost Summary -- This summary presents costs of personnel, equipment and other costs for general government, the University System and an overall total.

2. The 1976-77 Information Processing Resources Cost Summary by Agency -- This summary presents the general government costs by agency.

3. The 1976-77 Information Processing Resources Cost Summary by Unit -- Details of the University System costs are presented by unit.

4. A Detail of Annual Information Processing Costs -- The detail cost components supporting the summarizations are presented for each Agency and University System Unit.

(THIS PAGE LEFT BLANK INTENTIONALLY)

STATE OF MONTANA
STATEWIDE
1976-77 INFORMATION PROCESSING RESOURCES COST SUMMARY

GOVERNMENTAL AREA	PERSONNEL		EQUIPMENT				Leased Software	Outside Services	Other Costs	Total**
	FTE's	Salary & Benefits	Lease* Equivalent	Purchase		Lease				
				1976-77 Payment	Maintenance					
GENERAL GOVERNMENT	370.4	$4,315,586	$1,067,831	$643,902	$169,365	$1,117,041	$43,524	$666,937	$319,655	$7,276,010
UNIVERSITY SYSTEM	76.5	1,006,769	512,096	121,802	125,685	142,746	2,136		126,002	1,525,140
TOTAL	446.9	$5,322,355	$1,579,927	$765,704	$295,050	$1,259,787	$45,660	$666,937	$445,657	$8,801,150

The statewide total of $8,801,150 represents "real" dollars expended. If the lease equivalent amount of $1,579,927 is substituted for the 1976-77 payment amount of $765,704 then the statewide total is $9,615,373 which represents the annual value of data processing resources used.

* LEASE EQUIVALENT was calculated by dividing the original purchase cost by 44 months and multiplying by 12 to obtain an annual value.

** TOTAL does not include lease equivalent cost for purchased equipment.

(THIS PAGE LEFT BLANK INTENTIONALLY)

STATE OF MONTANA
GENERAL GOVERNMENT
1976-77 INFORMATION PROCESSING RESOURCES COST SUMMARY

AGENCY	PERSONNEL		EQUIPMENT				Leased Software	Outside Services	Other Costs	Total**
	FTE's	Salary & Benefits	Lease* Equivalent	Purchase		Lease				
				1976-77 Payment	Maintenance					
Department of Administration	128.2	$1,589,281	$ 568,838	$489,060	$ 55,728	$ 323,316	$14,196		$144,444	$2,616,025
Department of Agriculture	1.5	15,481								15,481
State Auditor	1.5	14,690	2,455			6,312				21,002
Department of Community Affairs	4.0	55,853	95			2,964				58,817
Department of Fish & Game	1.0	10,233				16,764				26,997
Governor's Office	1.0	17,798				3,420				21,218
Department of Health & Environmental Services	5.3	72,877				8,784		$24,405	275	106,341
Department of Highways	50.0	668,430	359,443	154,842	44,100	166,020	24,612	18,012	45,650	1,121,666
Department of Institutions	3.0	46,627				16,284				62,911
Department of Justice	43.5	422,171	9,000		5,568	255,624	4,200	14,520	57,496	759,579
Department of Labor & Industry	45.6	435,839	78,214		46,707	102,273	516		56,128	641,463
Legislative Auditor	1.0	16,950								16,950
Legislative Council	7.0	66,308				47,784				114,092
Lieutenant Governor	1.0	13,560								13,560
Department of Natural Resources & Conservation	3.8	60,124	196			4,344			420	64,888
Department of Revenue	38.0	451,350				75,804			742	527,896
Secretary of State						1,320				1,320
Department of Social & Rehabilitation Services	23.0	226,221				84,900		600,000	14,500	925,621
Superintendent of Public Instruction	12.0	131,793	49,590		17,262	1,128		10,000		160,183
TOTAL	370.4	$4,315,586	$1,067,831	$643,902	$169,365	$1,117,041	$43,524	$666,937	$319,655	$7,276,010

* LEASE EQUIVALENT was calculated by dividing the original purchase cost by 44 months and multiplying by 12 to obtain an annual value.

** TOTAL does not include lease equivalent cost for purchased equipment.

(THIS PAGE LEFT BLANK INTENTIONALLY)

STATE OF MONTANA
UNIVERSITY SYSTEM
1976-77 INFORMATION PROCESSING RESOURCES COST SUMMARY BY UNIT

UNIVERSITY UNIT	PERSONNEL		EQUIPMENT				Leased Software	Other Costs	Total**
				Purchase					
	FTE's	Salary & Benefits	Lease* Equivalent	1976-77 Payment	Maintenance	Lease			
Dawson College	2.0	$ 17,628	$ 573		$ 306				$ 17,934
Eastern Montana College	4.0	62,153	23,782		6,447	$ 8,147		$ 13,800	90,547
Flathead Valley Community College	2.5	31,922	15,818		3,600	4,022		3,300	42,844
Miles City Community College			532		300			1,000	1,300
Montana College of Mineral Science & Technology	2.0	28,250	35,879		10,200	3,516		5,750	47,716
Montana State University	34.0	462,169	146,769	$ 24,552	46,920	117,569	$2,136	67,379	720,725
Northern Montana College	2.0	21,154	9,061		1,992	6,156			29,302
University of Montana	30.0	383,493	279,682	97,250	55,920	3,336		34,773	574,772
TOTAL	76.5	$1,006,769	$512,096	$121,802	$125,685	$142,746	$2,136	$126,002	$1,525,140

* LEASE EQUIVALENT was calculated by dividing the original purchase cost by 44 months and multiplying by 12 to obtain an annual value

** TOTAL does not include lease equivalent cost for purchased equipment

(THIS PAGE LEFT BLANK INTENTIONALLY)

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Administration

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	10.00	$ 145,793.00	
	Systems & Programming	33.00	406,709.00	
	Technical Systems	6.50	100,097.00	
	Operations	34.75	354,196.00	
	Data Entry	38.45	317,146.00	
	Other	5.50	82,502.00	
	Total	128.20		$1,406,443.00
	Total Fringe Benefits			182,838.00
Equipment	No.	Description		
	1	IBM 370/158 1 Megabyte CPU		
	7	IBM 3420-7 Tape Drives 1600 BPI - 320KB		
	3	IBM 3330-11 Disk Units 2.4 Billion Bytes		
	2	IBM 3333-11 Disk Units 1.6 Billion Bytes		
	1	IBM 1403-NI Printer 1100 LPM		
	1	IBM 3211 Printer 2000 LPM		
	1	IBM 3705 Communication Controller		
	1	IBM 3780 Remote Job Entry Station		
	5	IBM 3275/3277 CRT Terminals		
	2	IBM 3767/2741 Typewriter Terminals		
	1	Bromwel GC-6B SN101 Raster Scanner		
	1	IBM 3747 Diskette Data Converter		
	2	IBM 3741 Dual Station Diskette Punch		
	15	IBM 3742 Single Station Diskette Punch		
	8	IBM 029/129 Card Punch		
	1	IBM 514 Reproducer		
	1	IBM 082 Sorter		
	1	IBM 557 Interpreter		
	Purchase Cost		2,085,741.00	
	Remaining Purchase Payments		1,753,928.00	489,060.00
	Monthly Maintenance Cost		4,644.00 x 12 =	55,728.00
	Monthly Lease Cost		26,943.00 x 12 =	323,316.00
Software	Purchase Cost		44,271.00	
	Monthly Lease Cost		1,183.00 x 12 =	14,196.00
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			144,444.00
	TOTAL			$2,616,025.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Agriculture

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	1.00	$11,200.00	
	Technical Systems			
	Operations			
	Data Entry	.50	2,500.00	
	Total	1.50		$13,700.00
	Total Fringe Benefits			1,781.00
Equipment	No.	Description		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost			
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$15,481.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
State Auditor

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming			
	Technical Systems			
	Operations			
	Data Entry	1.50	$13,000.00	
	Total	1.50		$13,000.00
	Total Fringe Benefits			1,690.00
Equipment	No.	Description		
	1	IBM 129 Card Punch		
	1	IBM 088 Collator		
	1	Burroughs 6002 CPU-Mini		
	Purchase Cost		9,000.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		526.00 x 12 =	6,312.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$21,002.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Community Affairs

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	3.00	$34,003.00	
	Technical Systems			
	Operations			
	Data Entry			
	Other	1.00	15,424.00	$49,427.00
	Total	4.00		
	Total Fringe Benefits			6,426.00
Equipment	No. Description			
	1 IBM 3767 Typewriter Terminal			
	1 IBM 2741 Typewriter Terminal			
	Purchase Cost		350.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		247.00 x 12 =	2,964.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$58,817.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Fish and Game

			FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration			
		Systems & Programming			
		Technical Systems			
		Operations	1.00	$9,056.00	
		Data Entry			
		Total	1.00		$ 9,056.00
		Total Fringe Benefits			1,177.00
Equipment	No.	Description			
	1	NCR 1399 Mini-Computer			
	1	IBM 3275 CRT Terminal			
	1	IBM 3277 CRT Terminal			
		Purchase Cost			
		Remaining Purchase Payments			
		Monthly Maintenance Cost			
		Monthly Lease Cost		1,397.00 x 12 =	16,764.00
Software		Monthly Lease Cost			
Outside Services					
Other		Other Costs (i.e., supplies, education, travel, etc.)			
		TOTAL			$26,997.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Governor's Office

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	1.00	$15,750.00	
	Technical Systems			
	Operations			
	Data Entry			
	Total	1.00		$15,750.00
	Total Fringe Benefits			2,048.00
Equipment	No.	Description		
	1	IBM 3767 Typewriter Terminal		
	1	ADDS 980 CRT Terminal		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		285.00 x 12 =	3,420.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$21,218.00

APPENDIX I

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Health and Environmental Sciences

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	.04	$ 750.00	
	Systems & Programming	1.04	13,610.00	
	Technical Systems			
	Operations			
	Data Entry	2.25	15,234.00	
	Other	2.00	34,899.00	
	Total	5.33		$ 64,493.00
	Total Fringe Benefits			8,384.00
Equipment	No.	Description		
	3	IBM 129 Card Punch		
	1	IBM 026 Card Punch		
	1	IBM 083 Sorter		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		732.00 x 12 =	8,784.00
Software	Purchase Cost		1,400.00	
Outside Services	1) Software Purchase/Lease		2,000.00	
	2) Programmers & Software Maintenance		2,000.00	
	3) Consultant		19,405.00	
	4) Other		1,000.00	24,405.00
Other	Other Costs (i.e., supplies, education, travel, etc.)			275.00
	TOTAL			$106,341.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Highways

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	2.00	$ 30,921.00	
	Systems & Programming	19.50	271,204.00	
	Technical Systems	3.00	49,992.00	
	Operations	12.00	132,796.00	
	Data Entry	12.00	86,080.00	
	Other	1.50	20,538.00	
	Total	50.00		$ 591,531.00
	Total Fringe Benefits			76,899.00

	No.	Description		
Equipment	1	IBM 370/145 I H2 CPU		
	1	IBM 5100 CPU		
	4	IBM 3420-5 Tape Drive		
	1	IBM 2314-01 Disk Drive		
	1	IBM 3333-II Disk Drive		
	3	IBM 3330-II Disk Drive		
	1	IBM 1403 Printer		
	1	IBM 1442-N1 Card RD/Punch		
	1	IBM 3540 Diskette Reader		
	1	Calcomp 563 Drum Plotter		
	10	IBM 2741 Typewriter Terminal		
	3	IBM 3275 CRT Terminal		
	1	IBM 3284 Printer		
	3	IBM 3741 Diskette Station		
	5	IBM 3742 Dual Diskette Station		
		Purchase Cost	1,317,957.00	
		Remaining Purchase Payments	30,000.00	154,842.00
		Monthly Maintenance Cost	3,675.00 x 12 =	44,100.00
		Monthly Lease Cost	13,835.00 x 12 =	166,020.00
Software		Purchase Cost	36,470.00	
		Monthly Lease Cost	2,051.00 x 12 =	24,612.00
Outside Services		Programmer & Software Maintenance		18,012.00
Other		Other Costs (i.e., supplies, education, travel, etc.)		45,650.00
		TOTAL		$1,121,666.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Institutions

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming			
	Technical Systems			
	Operations	2.00	$20,055.00	
	Data Entry			
	Other	1.00	21,208.00	
	Total	3.00		$41,263.00
	Total Fringe Benefits			5,364.00
Equipment	No.	Description		
	1	IBM 3277 CRT Terminal		
	1	IBM 3284 Printer		
	1	IBM 2741 Typewriter Terminal		
	1	Bell 4TO CRT Terminal		
	1	Bell 4TRXA Printer		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		1,357.00 x 12 =	16,284.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$62,911.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Justice

	No.		FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration	4.00	$ 69,620.00	
		Systems & Programming	5.00	76,111.00	
		Technical Systems Operations	12.00	90,546.00	
		Data Entry	22.50	137,326.00	
		Total	43.50		$373,603.00
		Total Fringe Benefits			48,568.00
	No.	Description			
Equipment	16	IBM 3277 CRT Terminal			
	1	IBM 3284 Printer			
	1	IBM 3286 Printer			
	8	Bell 4TO CRT Terminal			
	1	Bell PTR Printer			
	7	IBM 3742 Single Station Diskette Punch			
	1	IBM System/7 Mini-Computer			
	1	Nova 1200 Mini-Computer			
	3	IBM 3275 Printer & Terminal			
	1	IBM 2741 Typewriter Terminal			
		Purchase Cost		33,000.00	
		Remaining Purchase Payments			
		Monthly Maintenance Cost		464.00 x 12 =	5,568.00
		Monthly Lease Cost		21,302.00 x 12 =	255,624.00
Software		Monthly Lease Cost		350.00 x 12 =	4,200.00
Outside Services		Software Purchase/Lease		4,200.00	
		Computer Service Bureau		10,320.00	14,520.00
Other		Other Costs (i.e., supplies, education, travel, etc.)			57,496.00
		TOTAL			759,579.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Labor and Industry

			FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration			
		Systems & Programming	13.60	$159,317.00	
		Technical Systems			
		Operations	8.00	71,340.00	
		Data Entry	23.00	139,693.00	
		Other	1.00	15,348.00	
		Total	45.60		$385,698.00
		Total Fringe Benefits			50,141.00
Equipment	No.	Description			
	5	IBM 3277 CRT Terminal			
	2	IBM 3284 Printer			
	1	IBM 3767 Typewriter Terminal			
	19	IBM 129 Card Punch			
	2	IBM 408 Acct/Mach			
	2	IBM 088 Collator			
	2	IBM 514 Reproducer			
	1	IBM 557 Interpreter			
	1	IBM 548 Interpreter			
	1	IBM 083 Sorter			
	1	IBM 082 Sorter			
	1	Singer Card-to-Tape			
	1	IBM 2040 CPU			
	8	IBM 2314 Disk Storage			
	1	IBM 1403 Printer			
	4	IBM 3420 Tape Drives			
	1	IBM 2540 Card Reader/Punch			
	5	IBM 3277 CRT Terminal			
	1	IBM 3284 Printer			
		Purchase Cost		286,784.00	
		Remaining Purchase Payments			
		Monthly Maintenance Cost		3,892.25 x 12 =	46,707.00
		Monthly Lease Cost		8,522.71 x 12 =	102,272.52
Software		Purchase Cost		8,000.00	
		Monthly Lease Cost		43.00 x 12 =	516.00
Outside Services					
Other		Other Costs (i.e., supplies, education, travel, etc.)			56,128.00
		TOTAL			$641,462.52

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Legislative Auditor

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	1.00	$15,000.00	
	Technical Systems			
	Operations			
	Data Entry			
	Total	1.00		$15,000.00
	Total Fringe Benefits			1,950.00
Equipment	No.	Description		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost			
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$16,950.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Legislative Council

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	1.00	$15,000.00	
	Systems & Programming			
	Technical Systems			
	Operations			
	Data Entry	6.00	43,680.00	
	Total	7.00		$ 58,680.00
	Total Fringe Benefits			7,628.00
Equipment	No. Description			
	2 IBM 2741 Typewriter Terminal			
	12 CRT Terminal			
	2 IBM 3775 Printer			
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		3,982.00 x 12 =	47,784.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$114,092.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Lt. Governor

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	1.00	$12,000.00	
	Technical Systems			
	Operations			
	Data Entry			
	Total	1.00		$12,000.00
	Total Fringe Benefits			1,560.00
Equipment	No. Description			
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost			
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$13,560.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Natural Resources and Conservation

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming	3.83	$53,207.00	
	Technical Systems			
	Operations			
	Data Entry			
	Total	3.83		$53,207.00
	Total Fringe Benefits			6,917.00
Equipment	No. Description			
	1 IBM 2741 Typewriter Terminal			
	1 ASR 33 Teletype Terminal			
	1 029 IBM Card Punch			
	1 059 IBM Card Verifier			
	Purchase Cost		720.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		362.00 x 12 =	4,344.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			420.00
	TOTAL			$64,888.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Revenue

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	4.00	$ 66,329.00	
	Systems & Programming	13.00	163,022.00	
	Technical Systems			
	Operations	5.00	42,566.00	
	Data Entry	12.00	86,350.00	
	Other	4.00	41,158.00	
	Total	38.00		$399,425.00
	Total Fringe Benefits			51,925.00

	No.	Description		ANNUAL COST
Equipment	8	IBM 3742 Single Station Diskette Punch		
	3	IBM 129 Card Punch		
	1	IBM 3741 Dual Station Diskette Punch		
	1	IBM 2152 Printer		
	1	IBM 2922 R.J.E. Station		
	2	IBM 2741 Typewriter Terminal		
	4	IBM 3767 Typewriter Terminal		
	2	ADDS 980 CRT Terminal		
	2	Decwriter II Printer		
		Purchase Cost		
		Remaining Purchase Payments		
		Monthly Maintenance Cost		
		Monthly Lease Cost	6,317.00 x 12 =	75,804.00
Software		Monthly Lease Cost		
Outside Services				
Other		Other Costs (i.e., supplies, education, travel, etc.)		742.00
		TOTAL		$527,896.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Secretary of State

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming			
	Technical Systems			
	Operations			
	Data Entry			
	Total			
	Total Fringe Benefits			
Equipment	No. Description			
	1 IBM 2741 Typewriter Terminal			
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		110.00 x 12 =	$1,320.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			______
	TOTAL			$1,320.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Social and Rehabilitation Services

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	2.00	$ 27,984.00	
	Systems & Programming	3.00	44,231.00	
	Technical Systems			
	Operations	6.00	49,971.00	
	Data Entry	8.00	51,101.00	
	Other	4.00	26,909.00	
	Total	23.00		$200,196.00
	Total Fringe Benefits			26,025.00
Equipment	No.	Description		
	1	IBM 2922 R.J.E. Station		
	1	IBM 3284 Printer		
	3	IBM 3277 CRT Terminal		
	1	IBM 3275 CRT Terminal		
	Purchase Cost			
	Remaining Purchase Payments			
	Monthly Maintenance Cost			
	Monthly Lease Cost		7,075.00 x 12 =	84,900.00
Software	Monthly Lease Cost			
Outside Services	Computer Service Bureau			600,000.00
Other	Other Costs (i.e., supplies, education, travel, etc.)			14,500.00
	TOTAL			$925,621.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Superintendent of Public Instruction

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	2.00	$ 28,130.00	
	Systems & Programming	4.00	50,425.00	
	Technical Systems			
	Operations	3.00	15,231.00	
	Data Entry	3.00	22,845.00	
	Total	12.00		$116,631.00
	Total Fringe Benefits			15,162.00
Equipment	No.	Description		
	1	Honeywell H 115/2 CPU		
	4	Honeywell 204 Tape Drives		
	1	Honeywell 214 Card Reader/Punch		
	1	Honeywell 122 Printer		
	1	Honeywell 172 Disk Drive		
	1	IBM 026 Card Punch		
	3	IBM 029 Card Punch		
	1	IBM 514 Card Reproduce		
	1	IBM 548 Card Interpreter		
	1	IBM 085 Collator		
	1	IBM 082 Card Sorter		
	2	IBM 059 Card Verifier		
	1	IBM 056 Card Verifier		
	Purchase Cost		181,830.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost		1,438.50 x 12 =	17,262.00
	Monthly Lease Cost		94.00 x 12 =	1,128.00
Software	Monthly Lease Cost			
Outside Services	Computer Service Bureau			10,000.00
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$160,183.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Dawson College

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	1.00	$10,200.00	
	Systems & Programming			
	Technical Systems			
	Operations			
	Data Entry	1.00	5,400.00	
	Total	2.00		$15,600.00
	Total Fringe Benefits			2,028.00
Equipment	No. Description			
	1 IBM 026 Card Punch			
	1 IBM 082 Sorter			
	Purchase Cost		2,100.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost		25.50 x 12 =	306.00
	Monthly Lease Cost			
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			
	TOTAL			$17,934.00

APPENDIX I

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Eastern Montana College

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	1.00	$18,700.00	
	Systems & Programming	1.00	16,800.00	
	Technical Systems			
	Operations	1.00	11,648.00	
	Data Entry	1.00	7,855.00	
	Total	4.00		$55,003.00
	Total Fringe Benefits			7,150.00
	No.	Description		
Equipment	1	IBM 360/20 CPU		
	1	PDP-8A Classic Mini-Computer		
	1	Altair 8800 Mini-Computer		
	1	IBM 2560 A1 Card Machine		
	1	IBM 2203 A1 Printer		
	1	IBM 2311 Disk		
	3	Teletype ASR33TC		
	1	Hazeltine 2000 CRT		
	1	Digilog Tele. II		
	2	DEC. LA 36 Printer		
	4	IBM 029 Card Punch		
	2	IBM 129 Card Punch		
	1	IBM 083 Sorter		
	Purchase Cost		87,200.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost		537.25 x 12 =	6,447.00
	Monthly Lease Cost		678.92 x 12 =	8,147.04
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			13,800.00
	TOTAL			$90,547.04

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Flathead Valley Community College

			FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration	.50	$ 7,850.00	
		Systems & Programming	1.00	12,700.00	
		Technical Systems			
		Operations	1.00	7,700.00	
		Data Entry			
		Total	2.50		$28,250.00
		Total Fringe Benefits			3,672.00
Equipment	No.	Description			
	1	IBM 1130 CPU			
	1	T.I. ASR 733 Terminal			
	2	IBM 029 Card Punch			
	1	IBM 085 Collator			
		Purchase Cost		58,000.00	
		Remaining Purchase Payments			
		Monthly Maintenance Cost		300.00 x 12 =	3,600.00
		Monthly Lease Cost		335.20 x 12 =	4,022.40
Software		Purchase Cost		500.00	
Outside Services					
Other		Other Costs (i.e., supplies, education, travel, etc.)			3,300.00
		TOTAL			$42,844.00

APPENDIX I

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Miles City Community College

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration			
	Systems & Programming			
	Technical Systems			
	Operations			
	Data Entry			
	Total			
	Total Fringe Benefits			
Equipment	No. Description			
	1 IBM 026 Keypunch			
	1 IBM 082 Sorter			
	Purchase Cost		1,950.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost		25.00 x 12 =	$ 300.00
	Monthly Lease Cost			
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			1,000.00
	TOTAL			$1,300.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Montana College of Mineral Science and Technology

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	1.00	$15,000.00	
	Systems & Programming	1.00	10,000.00	
	Technical Systems			
	Operations			
	Data Entry			
	Total	2.00		$25,000.00
	Total Fringe Benefits			3,250.00
Equipment	No.	Description		
	1	DEC/PDP 11/70 CPU		
	1	DEC/TS03 Tape Drive		
	1	DEC/LP05 Printer		
	1	DEC/CR11 Card Reader		
	10	DEC/LA36 Terminal		
	2	ASR/33 Teletypes		
	1	CALCOMP/563		
	3	CRT's		
	Purchase Cost		131,555.00	
	Remaining Purchase Payments			
	Monthly Maintenance Cost		850.00 x 12 =	10,200.00
	Monthly Lease Cost		293.00 x 12 =	3,516.00
Software	Monthly Lease Cost			
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			5,750.00
	TOTAL			$47,716.00

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Montana State University

			FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration	3.00	$ 43,222.00	
		Systems & Programming	12.00	168,161.00	
		Technical Systems	4.00	67,622.00	
		Operations	8.00	79,742.00	
		Data Entry	7.00	50,252.00	
		Total	34.00		$408,999.00
		Total Fringe Benefits			53,170.00
	No.	Description			
Equipment	1	Xerox Sigma 7 CPU			
	3	Xerox 7332 Tape Drive			
	3	Xerox Rad			
	4	Telefile Disk			
	1	7445 Printer			
	1	7446 Printer			
	1	7140 Card Reader			
	1	7165 Card Punch			
	1	930 Plotter			
	6	CRT Terminal			
	1	IBM 083 Sorter			
	13	Card Punch			
	1	Test Scoring Machine			
	1	Burroughs B1705 CPU			
	1	Burroughs B9480 Disk Drive			
	1	Burroughs B9247 Printer			
	1	Burroughs B9115 Card Reader			
	2	Hazeltine 2000 CRT Terminal			
	1	Hazeltine 1000 CRT Terminal			
	3	IBM 129 Card Punch			
	1	IBM 029 Card Punch			
	3	Hazeltine 2000 CRT Terminal			
	1	IBM 029 Card Punch			
	1	IBM 129 Card Verifier			
		Purchase Cost		538,156.00	
		Remaining Purchase Payments		24,552.00	24,552.00
		Monthly Maintenance Cost		3,910.00 x 12 =	46,920.00
		Monthly Lease Cost		9,797.42 x 12 =	117,569.04
Software		Monthly Lease Cost		178.00 x 12 =	2,136.00
Outside Services					
Other		Other Costs (i.e., supplies, education, travel, etc.)			67,379.00
		TOTAL			$720,725.04

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - Northern Montana College

			FTE	ANNUAL SALARY	ANNUAL COST
Personnel		Administration			
		Systems & Programming	1.00	$11,533.00	
		Technical Systems			
		Operations			
		Data Entry	1.00	7,187.00	
		Total	2.00		$18,720.00
		Total Fringe Benefits			2,434.00
Equipment	No.	Description			
	1	IBM 407 Accounting Machine			
	4	33ASR Data Terminals			
	1	H-P Mini-Computer			
	1	IBM 024 Card Punch			
	1	IBM 029 Card Punch			
	1	IBM 082 Sorter			
	1	IBM 085 Collator			
	1	IBM 514 Reproducer			
	1	IBM 548 Interpreter			
		Purchase Cost		33,223.00	
		Remaining Purchase Payments			
		Monthly Maintenance Cost		166.00 x 12 =	1,992.00
		Monthly Lease Cost		513.00 x 12 =	6,156.00
Software		Monthly Lease Cost			
Outside Services					
Other		Other Costs (i.e., supplies, education, travel, etc.)			
		TOTAL			$29,302.00

APPENDIX I

STATE OF MONTANA
DETAIL OF FY 77 INFORMATION PROCESSING COSTS
Department of Education - University of Montana

		FTE	ANNUAL SALARY	ANNUAL COST
Personnel	Administration	2.00	$ 26,229.00	
	Systems & Programming	9.00	125,040.00	
	Technical Systems	3.00	47,586.00	
	Operations	9.00	94,320.00	
	Data Entry	7.00	46,199.00	
	Total	30.00		$339,374.00
	Total Fringe Benefits			44,119.00
Equipment	No.	Description		
	1	D.E.C. System-1050 CPU		
	3	D.E.C. TSU 43 Tape Drive		
	3	D.E.C. RP02 Disk Drive		
	2	D.E.C. RP03 Disk Drive		
	1	D.E.C. LSP10J Printer		
	1	D.E.C. CR10D Card Reader		
	1	D.E.C. DP10A Card Punch		
	1	D.E.C. XP10B Plotter		
	24	CRT Terminals		
	48	Hardcopy Terminals		
	1	IBM 082 Sorter		
	1	IBM 083 Sorter		
	1	IBM 085 Collator		
	2	IBM 514 Card Reproducer		
	2	IBM 557 Interpreter		
	9	IBM 029 Card Punch		
	4	IBM 059 Verifier		
	1	D.E.C. PC09		
	Purchase Cost		1,025,500.00	
	Remaining Purchase Payments		291,750.00	97,250.00
	Monthly Maintenance Cost		4,660.00 x 12 =	55,920.00
	Monthly Lease Cost		278.00 x 12 =	3,336.00
Software	Purchase Cost		6,000.00	
Outside Services				
Other	Other Costs (i.e., supplies, education, travel, etc.)			34,773.00
	TOTAL			$574,772.00

(THIS PAGE LEFT BLANK INTENTIONALLY)

APPENDIX II INVENTORY OF KEY APPLICATIONS

INVENTORY OF KEY APPLICATIONS

An inventory of key applications being processed by the various information processing centers is presented in this Appendix. The agency responsible for the application, application name and a brief description (if necessary) are included.

(THIS PAGE LEFT BLANK INTENTIONALLY)

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Dept. of Administration Data Center	
1) Dept. of Natural Resources	HIPLEX (High Plains Experiment Rainfall Analysis)
	Montana Health Data Management System
	EMS Evaluation System (Data concerning Emergency Medical Service)
	SLIC System (Scale License & Inspection Computer System)
	Nurse Record System
	Cellular Composite Planning
	Water Planning
2) Fish & Game	Budgeting & Accounting System
	License & Drawing System
	Fisheries Service
	Hunter & Trapper Surveys
	Employee Activity Report System
	Game Research
	Angler Pressure Survey
	Recreation Demand Inventory
3) Social and Rehabilitation Services	Eligibility Determination
	Montana Service System
	R-300 System (Vocational Rehabilitation Reporting)
4) Workers' Compensation Division	Accident/Insurance Coverage

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Dept. of Admin. (continued)	
4) Workers' Compensation Division (continued)	Payments Reporting
	Input/Process Financial Data
	Management Information
5) Agriculture	Grain Movement Survey
6) Administration - Communications	Telephone Accounting System
7) Administration - Accounting	SBAS
8) Administration - PERS	Retirement System Data
9) Administration - Personnel	Position Control System
10) Administration - Teachers Retirement System	Retirement System Data
	Benefit Payments
11) Administration - Investment	PMS (Portfolio Management System)
12) Legislative Council	ALTER (Automated Legal Text Entry & Retrieval System)
13) State Auditor - Payroll	Central Payroll System
	Insurance Agent License
	Warrant Writing System
14) Revenue	Liquor Reporting System

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Dept. of Admin. (continued)	
14) Revenue (continued)	Beer & Liquor Licensing System
	Income Tax Processing
	Withholding Tax Processing
	Accounts Receivable
	Mass Appraisal/Utilities
	Fuel Permit Processing
	Gasoline Drawbacks
15) Institutions	Aftercare Movement
	Supply Inventory Monitoring System
	Patient Accounts
16) Crime Control	Arrest Register
	Grants Management
	Juvenile Probation Information System
17) Health	Mixed Air Quality Data
	Water Quality
18) Governor's Office	Executive Budget

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Highways Data Center	
1) Dept. of Community Affairs	Montana Futures Project (Economic Modeling of Montana)
2) Justice	Motor Vehicle Registration
	Drivers Licensing
	Police Traffic Service
	Accident Subsystem
	Law Enforcement Terminal System
3) Highways	Motor Pool
	Highway Equipment
	Stores
	Inventory
	Federal Aid Expenditures
	Cost Accounting
	Concurrent Audit
	Personnel
	GVW Quarterly Registration
	GVW County Registration
	GVW Permit Inventory
	GVW Proration System
	Highway Design
	Hydraulics Design & Analysis
	Construction Earthwork

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Highways (continued)	
3) Highways (continued)	Construction Estimates Open Range Inventory Bridge Design & Analysis Bridge Rating Traffic Roadlog Sufficiency (Roadway Adequacy) Sign Inventory Outdoor Advertising Offenses Known to Police

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Employment Security Division Data Center	
1) Employment Security Division	Benefit Check Writing System
	Cost Accounting
	Employer Tax Accounting
	ESARS (Employment Security Automated Reporting System)

APPENDIX II

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Montana State University	
1) MSU - Business Office	Personnel Records
	Inventory
	Registration Billing
	Accounting
	Payroll
	Financial Aid
2) MSU - Registrar Office	Student Registration
	Drop/Add
	On-Line Master Class
	On-Line Student Data Bank
	Grades
Eastern Montana College	Budgeting
	Accounting
	Payroll
	Student Records
	Physical Plant
	Library Periodical Reports
University of Montana	Student Records
	Student Loan
	Payroll/Personnel

INVENTORY OF KEY APPLICATIONS

Data Processing Center/User Agency	Application
Univ. of Montana (continued)	Financial Aid Accounts Receivable Accounting - General Ledger Accounting - Budget
Office of Superintendent of Public Instruction	Student Accounting Teacher Certification Audio-Visual Library Library Billing Student Scheduling State Equalization Test Scoring

APPENDIX III SYSTEMS DEVELOPMENT PROJECT PLANNING PROCESS

SYSTEMS DEVELOPMENT PROJECT PLANNING PROCESS

Introduction

This appendix presents a recommended methodology for systems development project planning which:

1. Will define key tasks and steps within development phases.
2. Provide a framework within which project management and control can occur.
3. Relate the development effort to the biennial and continuous planning recommendations and to the mechanism for setting priorities which are described in Chapter 4 of Volume 1.

The six basic phases of a system development project (feasibility study, preliminary design, detail design and construction, system testing, implementation and post-conversion review of costs and benefits) and on-going production system support are shown on the overall Systems Development Planning Chart (Exhibit VIII). Major steps within each of the phases are shown in Exhibits IX through XII. Together, the charts and narrative explain the flow of the major project steps. The systems development managers and the various project managers should use these charts as guidelines for planning future projects. Two changes to the present phases defined by the Department of Administration are suggested. First, detail design and construction (programming) have been combined. Second, a post-conversion phase has been added. It is recommended that the planning charts in this chapter be adopted for use on all future systems development projects.

Project Phases

The six phases of systems development are discussed in greater detail below.

Feasibility Study

The objective of this phase is to provide the user department management, systems and development groups (including the DOA's, as needed), the Montana

Data Processing Advisory Committee and the Office of Budget and Program Planning with the information necessary to make informed decisions on whether resources should be expended on designing and implementing the new systems. (Exhibit IX should be folded out for reference while reading the following material.)

The first segment in this phase is to organize the project (Segment a.). Once an area has been approved for study, two activities must be completed and approved before any investigation can begin: a detailed work program and arrangements for management involvement. An interdisciplinary task force should be used to staff the project, and on larger interdepartmental projects management involvement entails the formation of a project steering committee.

Performing the hi-spot review (Segment b.) includes conducting interviews, discussing systems and information requirements with key personnel, noting the present methods, costs and problems. The objective is to gather sufficient information about the present system and information requirements to provide a sound basis for developing the conceptual design.

The conceptual system design (Segment c.) results in an approximate idea of the system input and how the system will process it to produce the desired output. Measurable products of this segment should include a top-level flow chart showing major inputs, computer processing phases, computer master files, outputs and interfaces with other systems.

Once the basic system has been defined, the next tasks are to estimate costs and benefits and develop a detail work program for analysis and preliminary design and a high-level work program for the remaining phases (Segments d. and e., respectively). The work programs will serve as one of the basic elements used to estimate the one-time costs of developing the system.

The final segment of this phase (Segment f.) is to decide whether to proceed with the analysis and preliminary design phase based on the feasibility study report. The report to agency management should emphasize those aspects of the system which would create a higher priority for the project. After the report is reviewed by the user agency, the user agency director should approve or disapprove the report. If the report is approved, a priority should be assigned to the project using the mechanism described in Chapter 4 (Section 4.5) of Volume 1.

Analysis and Preliminary Design

This phase of computer systems development is the most critical because it determines the implementation and operating methods. The objective is to develop enough detail to accurately estimate the installation and operating characteristics of the system. This phase should provide sufficient supporting evidence to substantiate these estimates to concerned management.

The first segment of this phase is to organize the project (Segment a). This involves revising and approving the detail work program prepared during the feasibility study. The project team is organized and oriented. Positive management involvement is arranged for and, if the project is large and/or interdepartmental, a project steering committee should be organized.

The next three segments in the system design phase can be undertaken simultaneously. Analyzing the present system (Segment b.) is essential for satisfactory completion of this phase. The objective of Segment b. is to gather sufficient detailed information about the present system to provide a sound basis for designing the new system. Documentation of this task is very important and should include interview notes; procedural and systems flowcharts; inventories of computer programs, output reports, source documents and master files; volumes of transactions; details of specific problems and details of additional information requirements. An analysis of personnel, equipment and other costs (Segment c.) should also be prepared. The information gathered in the review of the present system and in interviews with user personnel provides the foundation for determining the new information requirements (Segment d.) and these requirements in turn dictate the design of the output reports.

Design System

When Segments b., c. and d. are completed, the information needed in order to design the system (Segment e.) should have been gathered. Before development can continue, it must be determined whether teleprocessing (TP) or data base management systems (DBMS) are going to be used in the system being designed. If TP or DBMS are not involved, there are four sub-segments to Segment e. that must be performed, which cover design of output reports, computer processing, file and data base requirements and input requirements (see Exhibit X). Most system design projects will require heavy management participation in designing output reports. The other areas are more technical, and require only management review of the concepts.

At this point the reader should refer to Exhibit X, which illustrates details of the general design (Segment e. of Exhibit IX) for standard batch systems as well as those involving on-line and/or data base considerations.

Designing the output reports (Segment A1 of Exhibit X) is the first major step in the system design. Upon completion of this step, a report package, which includes a sample of each report is submitted to management for its approval. The synopsis should contain the purpose, contents, frequency, sequence, timing, distribution and general controls of the report.

The next sub-segment is designing the computer processing (Segment A2). The top-level end product should be a complete system flowchart that depicts each input document; each transaction, master and intermediate file; each utility or processing program; and each output report. This system flowchart should be supported by a one-page synopsis for each program.

The next step is defining the file requirements (Segment A3), which involves identifying and describing all master files in the system. Following this is determining the input requirements (Segment A4), which includes descriptions and contents of all source documents and rough examples of the key source documents.

Design System (On-Line/Data Base)

If TP or DBMS is involved, in addition to the four sub-segments mentioned above, there are additional considerations that must be addressed in the design of the system. (See Exhibit X for a breakdown of the design system segment when TP or DBMS is involved.) Before the design process can begin, performance requirements (Segment B1 of Exhibit X) and system control and security guidelines (Segment B2) must be established. After these requirements and guidelines have been established, the batch reporting system (if applicable) can be designed (Segment B3). This is the same as Segment A1 in Exhibit X. In addition to the hard copy reports, the screens for on-line activities must be designed (Segment B4). During this same time period, the data base requirements are identified (Segment B5).

Before continuing further in the design, the type of processing equipment and systems software should be selected, if not already available. These will have a significant effect on four of the remaining design sub-segments: designing the data base (Segment B7), designing the on-line processing flow (Segment B8), designing the control and security features (Segment B9) and designing the support functions (Segment B10). Designing the batch processing system (Segment B6) and designing the data base (Segment B7) equate to Segments A2, A3 and A4, except that the data base file structure will reflect the data base management system being used and the data base requirements identified earlier in the design.

The last sub-segment in the design of the system is determining resource requirements (Segment B11). Before this segment can be performed, the telecommunication and terminal requirements should be defined and associated equipment should be selected before proceeding further. This step is very important because of the significant effect teleprocessing and data base management software and on-line processing can have on the system. This may point up that additional hardware is required in order to meet the performance requirements established earlier in the design.

The reader should return to Exhibit IX. The narrative below resumes the discussion of the Analysis and Preliminary Design Phase after the basic design has been completed (Segment e. of Exhibit IX).

Once the design of the system has been completed, the next segment in this phase is reviewing the system design for adherence to standards (Segment f.). It must be determined that all the required documentation is supplied and presented in the proper format. Design techniques and characteristics must also be checked against pre-defined system standards.

Based on the completed design, equipment needs can now be determined (Segment g.). As discussed above, when TP or DBMS is involved, equipment requirements should be analyzed earlier. The recommended equipment should be based on and supported by the volume statistics gathered for input, output and files during the design steps.

Before the economic analysis can be completed, the installation schedule must be developed (Segment h.). This step is extremely important since the installation schedule becomes the master work program for the detail design and construction, systems test and implementation phases. During this segment, detailed work steps are identified, estimates of manpower needs are made, time phasing of conversion activities is considered, and a practical timetable is established.

Once the above work has been completed, most of the groundwork needed for the economic evaluation of user and data processing costs and benefits (Segments i. and j.) has also been completed. The objective of these two steps is to update and refine the economic evaluation which was developed in the feasibility study phase. These estimates should then be reviewed for adherence to costing standards and for overall reasonableness (Segment k.).

The final segment in this phase is the approval of the preliminary system design (Segment l.). The report from the analysis and preliminary design phase must be approved by agency management before system installation can begin.

If the decision is made to continue with installation, the project's priority is re-examined as described in Chapter 4 (Section 4.5).

Detail Design and Construction

In this phase, the system design is converted to computer and manual procedures and readied for system testing (see Exhibit XI). The first task of this phase is organizing the project (Segment a.) for the installation effort. This includes refining the work program and assigning specific personnel to the detail design and construction tasks outlined in the installation work program. The next two tasks involve refining the work produced in the analysis and preliminary system design phase so that all data base files and source documents are defined and documented in detail (Segments b. and c.).

Once definition of the data base files have been finalized, the output reports finalized, and the design of the input forms finalized, the detail program run write-ups can be prepared (Segment d.). These should include detail documentation of all input to and output from each program (in the form of record and report layouts), a detail narrative of the processing to be done by the program, a general block diagram of the program logic, and any codes to be used in the program with their meanings. The Department of Administration should determine whether the standard for program run write-ups will follow the traditional narrative approach or something such as HIPO (Hierarchial Input/Output Processing) documentation. As each program run write-up is completed, it can be given to a programmer for detail flow charting, coding, testing, debugging and documenting (Segment e.). Thorough testing and documentation should be emphasized since the time spent on these tasks will normally be more than offset by the time saved in future maintenance and modification.

The system test plan (Segment f.) should include the scope and objectives of the system test, how and when it is going to be conducted, what type of conditions are to be tested, what type of test data are to be used, how the test data are to be developed, how the output is to be verified, computer time estimates for tests, personnel requirements for carrying out the system test, assignment of personnel, and a control schedule for verifying the completion of each testing step for each cycle.

The implementation plan (Segment g.) should include the detailed steps of the implementation activity, when the steps are to be performed, critical paths and potential problem areas, additional staffing requirements, assignment of personnel, plans for training both user and EDP personnel, cutoff schedules for both beginning the use of the new source documents and submitting them for processing, operations schedules, back-up procedures, special programmer procedures for the first run, and plans for building the master (data base) files.

Developing clerical and control procedures (Segments h. and i.) should be carried out simultaneously with the programming effort. The clerical and control procedures must be reviewed and approved by management, and should take into consideration source document preparation procedures, key inscribing and key verifying instructions for all source documents, output report distribution procedures, error correction and re-entry procedures, and the following control and balancing procedures: input, run-to-run, master file and output report.

System Test

This phase (see Exhibit XI) will insure that all the computer programs work together to produce the desired output and that the necessary personnel and files are available for operation.

The first task after organizing and orienting the assigned personnel (Segment a.) is to make sure that all of the individual programs have been tested, are producing the desired output, are completely documented, and conform to any other standards which have been established (Segment b.).

The test data should then be completed and converted to machine-readable format (Segment c.). Based on this test data, the anticipated output and control totals can be established before the tests are actually performed. When performing the system test (Segment d.), all output should be identified and saved until it has been evaluated. Successful tests results should be recorded on the testing control schedule (developed in the detail design and construction phase), and the output should be incorporated into the documentation. In evaluating the test results (Segment e.), established control procedures should be used so that the adequacy of the procedures can be determined.

Simultaneously with the computer system testing, user clerical personnel and management and data processing operating personnel can be trained (Segment f.). In some cases, the training may be directly related to the procedures for building master files (Segment g.). Building master files may require a large manual effort for clerical and keying personnel or may be accomplished by converting old card or tape files to the new format on the computer. Before proceeding to the implementation, the project team should present the test results in the form of output results and a summarized testing control schedule to management for approval. Also, management should be kept informed of the progress of personnel training and master file preparation.

Implementation

This phase is carried out according to the implementation control schedule prepared in the detail design and construction phase. This schedule should be updated with actual start and completion dates as the events occur and adjusted as necessary. (See Exhibit XI for a breakdown of the segments in this phase). As in most phases, the first segment involves organizing the project and project team according to the implementation control schedule (Segment a.). This organizing effort includes assigning project team members to critical manual or computer processing points and establishing checkpoints in the first implementation period to evaluate system performance. As implementation takes place (Segment b.), it should be carefully monitored (Segment c.). The key areas should be analyzed to determine whether system objectives are being reached and if any appropriate follow-up action is necessary. Careful review of internal and manual system controls must be maintained.

Final acceptance of the system (Segment d.) is of major importance and should be an objective review and analysis of the system. This step begins the day the first output is produced and ends when formal acceptance is given.

Post-Implementation Review of Costs and Benefits

This phase is the ultimate test of whether or not the system is achieving its objectives. The results of this evaluation will enable the MODPAC to analyze the performance of the Department of Administration and/or the agency in planning and implementing the system. This phase may identify opportunities for further reductions in the cost of operating the new system by determining if all the cost-saving steps defined in the system design have been or should be carried out.

The review should take place six months to one year after the conversion. The study should be formally organized, conducted and documented. The objectives are (a) to determine the actual costs and benefits for both the development and the on-going operation of the system, both in the user department and in data processing, and (b) to compare these costs and benefits with those developed at the end of the feasibility study and analysis and system design phases. Personnel costs should be computed both in numbers and dollars. In addition to cost savings, the study should also review intangible benefits and additional future savings. Any differences in the costs and benefits and the reasons therefore should be fully explained, understood and documented. The information accumulated in this study can then be used as a guideline for estimating cost for future systems and for evaluating the reasonableness of cost-benefit analysis for future systems.

Production System Support

Before discussing production system support, it is important to define maintenance and system modification.

Systems design and programming projects can be divided into four levels of work. In segregating systems development from production system support, we have assigned two levels of work to each group, as follows:

Magnitude of Work	Assigned To
Maintenance Minor modifications	Production system support
Major modifications (greater than 3 man-months of effort) New systems (all)	Systems development

Maintenance of computer programs is usually considered to be the correction of logic or format errors in programs which are otherwise operational. New programs not yet put into production are not included in this category. If a production program has no errors, changes cannot be considered maintenance; rather, they are classified as modifications.

Modifications are revisions to correctly running production programs which provide additional input, output or calculations, or which simplify or speed up a program. If the program is presently meeting its original intent, the change must be considered a modification. Two criteria are used in determining the difference between major and minor modifications. First, larger projects should be evaluated on the basis of their economic and other benefits since they are competing for a scarce resource. Secondly, smaller projects, which are more numerous, should require less evaluation. It is recommended that the State define minor modifications to include those projects which require three man-months of effort or less to define, design and implement the changes. Since each new project creates inefficient start-up and stopping time, unless a change is mandated, requests for changes to an application should be grouped so that each project requires no less than 10 man-days.

Maintenance and minor modification make up production system support. The steps required in production system support are actually a highly simplified version of the phases, segments and tasks for system development projects (see Exhibit XII). The first step is to initiate a change request (Segment a.). The need for a change may have been recognized by the user or operations staff, or the change request may be from the backlog of changes from system installation. The needed change must be expressed in user's terms on a change request. An economic evaluation of the requested change must be made.

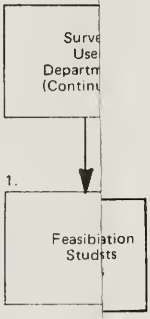
The next step (Segment b.) requires the evaluation and approval by agency management and the scheduling of the project taking into consideration other requests in the backlog. Before changes can be made, the approved request must be analyzed (Segment c.) and the logic and format changes for each program in the application must be defined. Once this is complete, coding of the changes, testing and debugging the programs and documenting the revisions to the programs (Segments d. and f., respectively) can be done.

Before the revised application can be implemented (Segment g.), it must be system tested (Segment e.) to insure that the errors have been corrected and that normal transactions (those not affected by the previous error or modified area) are still processed correctly. This testing should be evaluated by the user agency.

After the user has approved the modification as made, the revised programs should be put into production. Production should be monitored to insure that everything functions properly.

The final step in production system support is to review and evaluate (Segment h.) periodically the change requests as a whole and determine the causes and frequency of changes. This review process may point up a need for a project to revise a high maintenance application. This review process is related to the on-going agency survey. If a need is recognized, it should be summarized for management so they can determine if a feasibility study should be performed.

EXHIBIT VIII



Maintenance and minor modification make up production system support. The steps required in production system support are actually a highly simplified version of the phases, segments and tasks for system development projects (see Exhibit XII). The first step is to initiate a change request (Segment a.). The need for a change may have been recognized by the user or operations staff, or the change request may be from the backlog of changes from system installation. The needed change must be expressed in user's terms on a change request. An economic evaluation of the requested change must be made.

The next step (Segment b.) requires the evaluation and approval by agency management and the scheduling of the project taking into consideration other requests in the backlog. Before changes can be made, the approved request must be analyzed (Segment c.) and the logic and format changes for each program in the application must be defined. Once this is complete, coding of the changes, testing and debugging the programs and documenting the revisions to the programs (Segments d. and f., respectively) can be done.

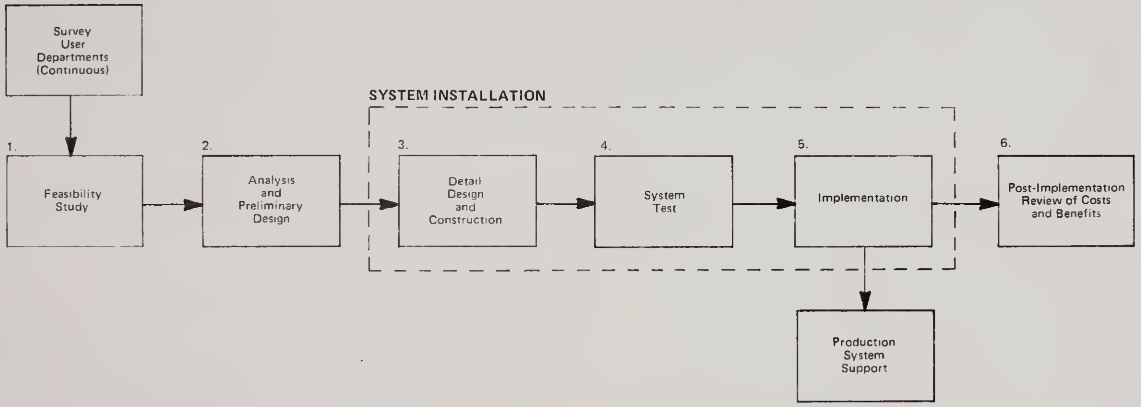
Before the revised application can be implemented (Segment g.), it must be system tested (Segment e.) to insure that the errors have been corrected and that normal transactions (those not affected by the previous error or modified area) are still processed correctly. This testing should be evaluated by the user agency.

After the user has approved the modification as made, the revised programs should be put into production. Production should be monitored to insure that everything functions properly.

The final step in production system support is to review and evaluate (Segment h.) periodically the change requests as a whole and determine the causes and frequency of changes. This review process may point up a need for a project to revise a high maintenance application. This review process is related to the on-going agency survey. If a need is recognized, it should be summarized for management so they can determine if a feasibility study should be performed.

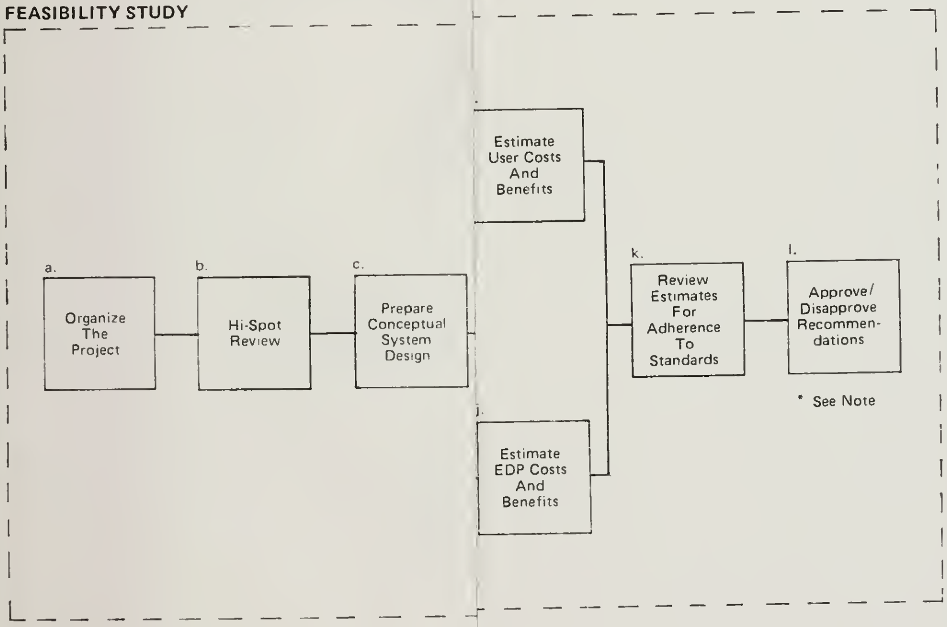
EXHIBIT VIII

STATE OF MONTANA
SYSTEM DEVELOPMENT PLANNING CHARTS
OVERALL APPROACH



Survey User Departments (Continuous)
SYSTEM INSTALLATION
1.
Feasibility Study
2.
Analysis and Preliminary Design
3.
Detail Design and Construction
4.
System Test
5.
Implementation
6.
Post-Implementation Review of Costs and Benefits
Production System Support

EXHIBIT IX

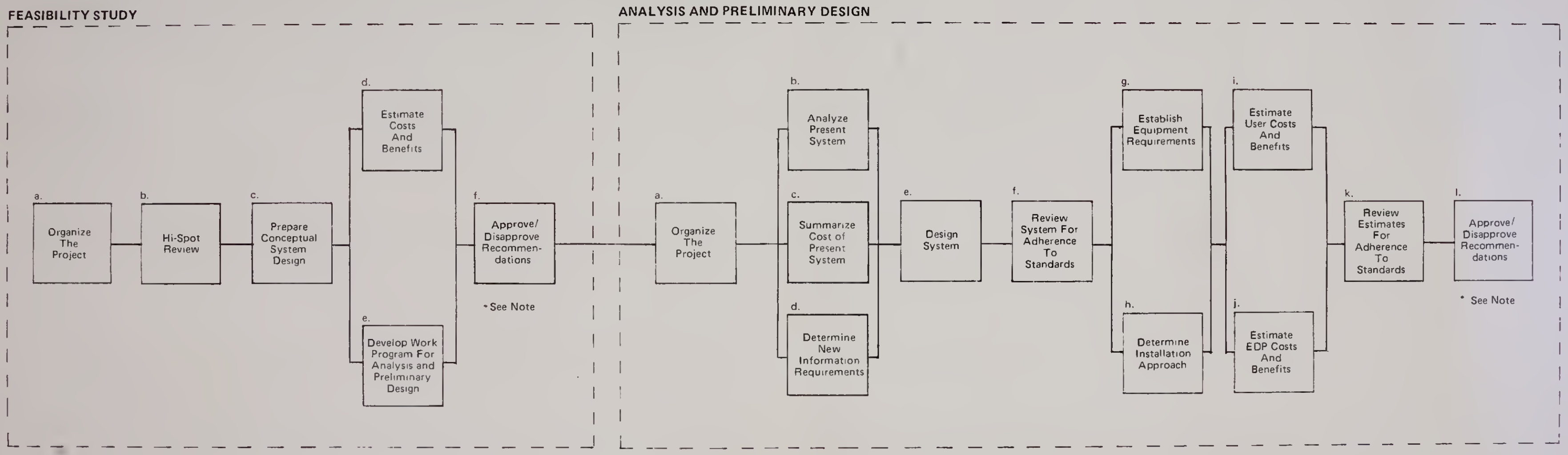

FEASIBILITY STUDY
a.
Organize The Project
b.
Hi-Spot Review
c.
Prepare Conceptual System Design
Estimate User Costs And Benefits
j.
Estimate EDP Costs And Benefits
k.
Review Estimates For Adherence To Standards
l.
Approve/ Disapprove Recommendations
* See Note

*NOTE:

The project's priority is examined
or not to continue with the next pl
assigned. If yes, a priority is estab
team begins work immediately wil
other projects and the total resource

EXHIBIT IX

STATE OF MONTANA
SYSTEM DEVELOPMENT PLANNING CHARTS
FEASIBILITY STUDY, ANALYSIS AND PRELIMINARY DESIGN


FEASIBILITY STUDY
a. Organize The Project
b. Hi-Spot Review
c. Prepare Conceptual System Design
d. Estimate Costs And Benefits
e. Develop Work Program For Analysis and Preliminary Design
f. Approve/ Disapprove Recommen- dations
* See Note
ANALYSIS AND PRELIMINARY DESIGN
a. Organize The Project
b. Analyze Present System
c. Summarize Cost of Present System
d. Determine New Information Requirements
e. Design System
f. Review System For Adherence To Standards
g. Establish Equipment Requirements
h. Determine Installation Approach
i. Estimate User Costs And Benefits
j. Estimate EDP Costs And Benefits
k. Review Estimates For Adherence To Standards
l. Approve/ Disapprove Recommen- dations
* See Note

*NOTE:

The project's priority is examined at these points. The basic decision is whether or not to continue with the next phase of the project. If no, the project team is reassigned. If yes, a priority is established as described in Section 4.5. Whether the team begins work immediately will depend on the project's relative priority with other projects and the total resources available.

EXHIBIT X

A. DESIGN SYSTEM

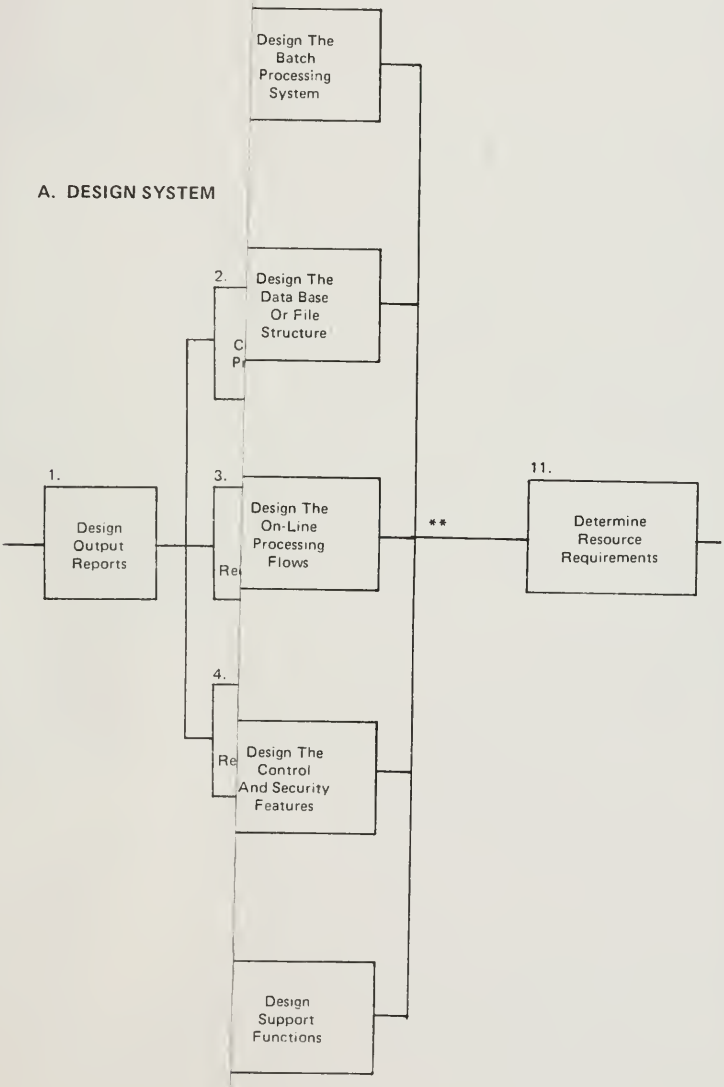
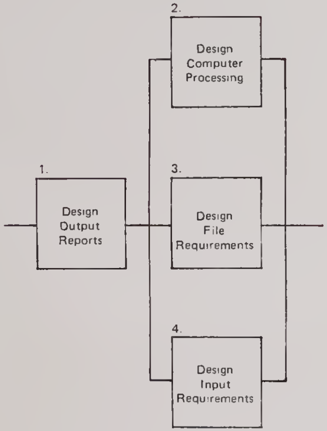

Design The Batch Processing System
2.
Design The Data Base Or File Structure
C
P
1.
Design Output Reports
3.
Re
Design The On-Line Processing Flows
**
11.
Determine Resource Requirements
4.
Re
Design The Control And Security Features
Design Support Functions

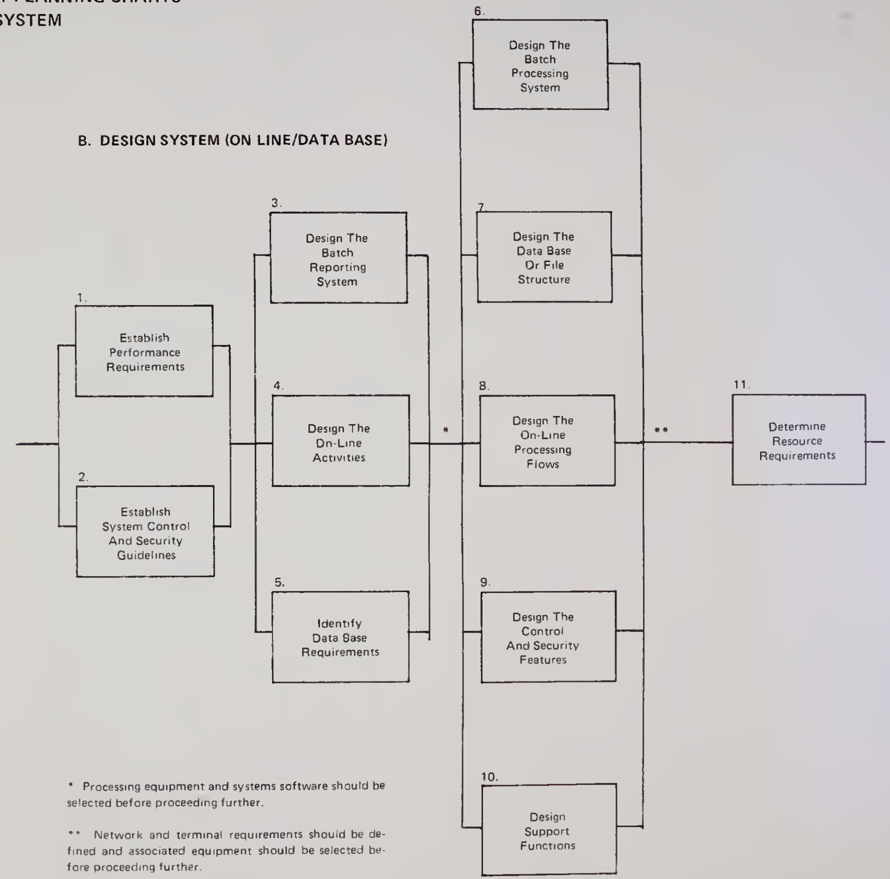
EXHIBIT X

STATE OF MONTANA
SYSTEM DEVELOPMENT PLANNING CHARTS
DESIGN SYSTEM

A. DESIGN SYSTEM



B. DESIGN SYSTEM (ON LINE/DATA BASE)


1.
Establish Performance Requirements
2.
Establish System Control And Security Guidelines
3.
Design The Batch Reporting System
4.
Design The On-Line Activities
5.
Identify Data Base Requirements
*
6.
Design The Batch Processing System
7.
Design The Data Base Or File Structure
8.
Design The On-Line Processing Flows
9.
Design The Control And Security Features
10.
Design Support Functions
**
11.
Determine Resource Requirements

* Processing equipment and systems software should be selected before proceeding further.

** Network and terminal requirements should be defined and associated equipment should be selected before proceeding further.

EXHIBIT XI

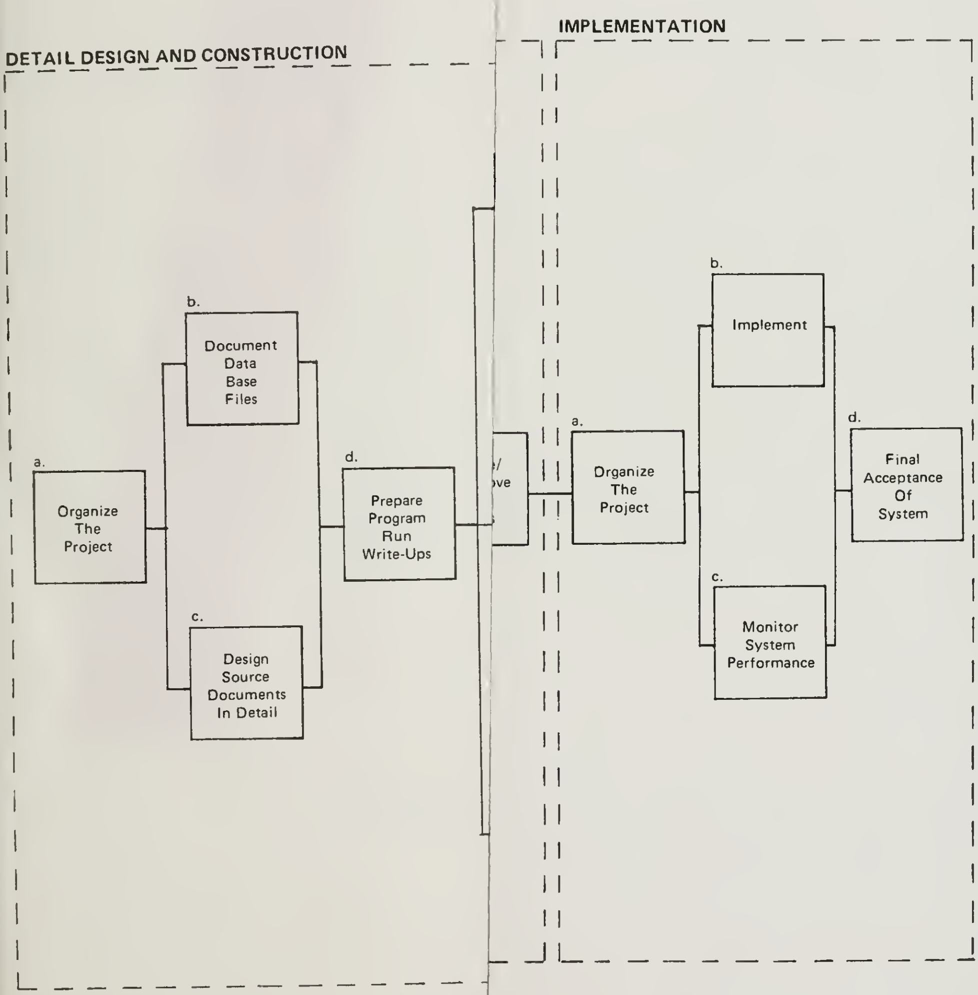

DETAIL DESIGN AND CONSTRUCTION
a.
Organize The Project
b.
Document Data Base Files
c.
Design Source Documents In Detail
d.
Prepare Program Run Write-Ups
IMPLEMENTATION
a.
Organize The Project
b.
Implement
c.
Monitor System Performance
d.
Final Acceptance Of System

EXHIBIT XI

STATE OF MONTANA
SYSTEM DEVELOPMENT PLANNING CHARTS
SYSTEM INSTALLATION

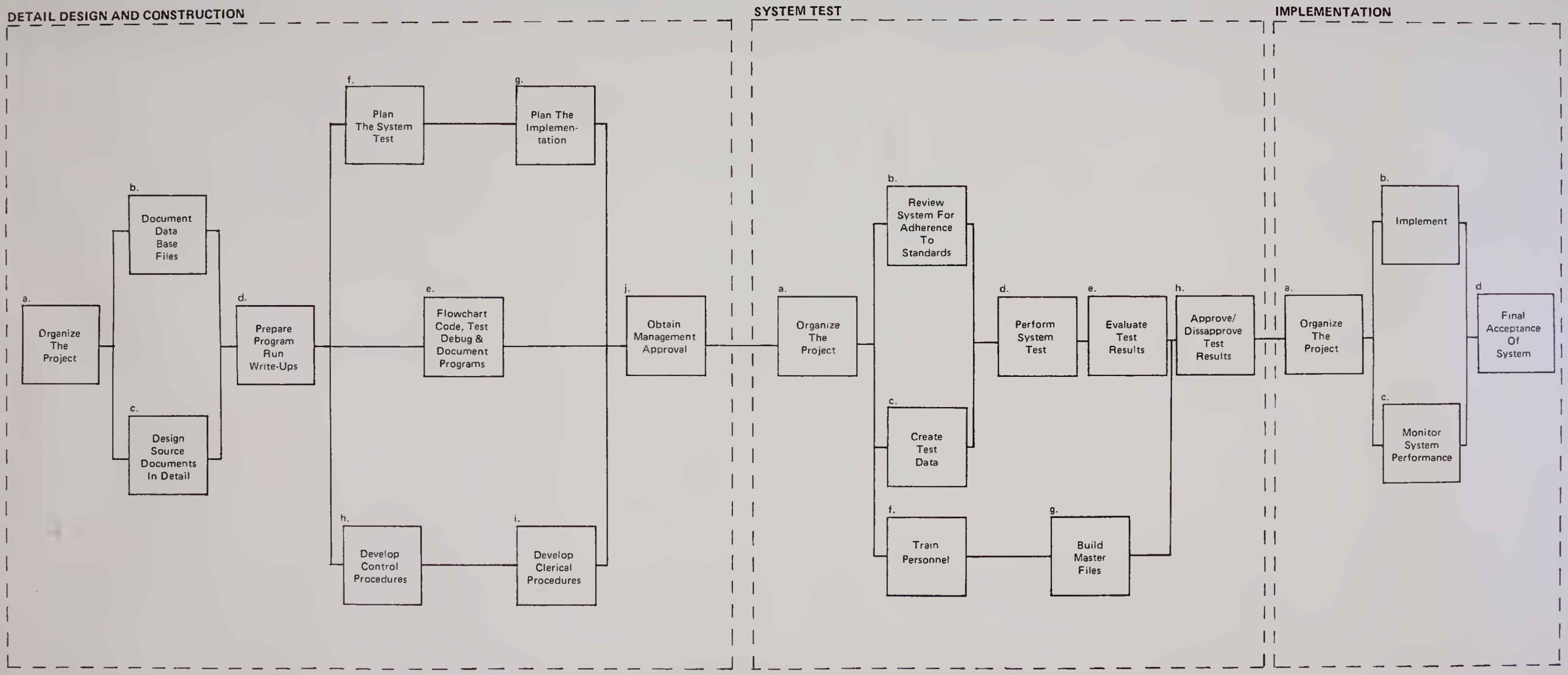

DETAIL DESIGN AND CONSTRUCTION
a. Organize The Project
b. Document Data Base Files
c. Design Source Documents In Detail
d. Prepare Program Run Write-Ups
f. Plan The System Test
g. Plan The Implemen-tation
e. Flowchart Code, Test Debug & Document Programs
h. Develop Control Procedures
i. Develop Clerical Procedures
j. Obtain Management Approval
SYSTEM TEST
a. Organize The Project
b. Review System For Adherence To Standards
c. Create Test Data
f. Train Personnel
g. Build Master Files
d. Perform System Test
e. Evaluate Test Results
h. Approve/ Dissapprove Test Results
IMPLEMENTATION
a. Organize The Project
b. Implement
c. Monitor System Performance
d Final Acceptance Of System

EXHIBIT XII

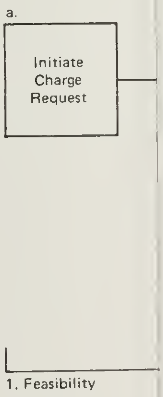
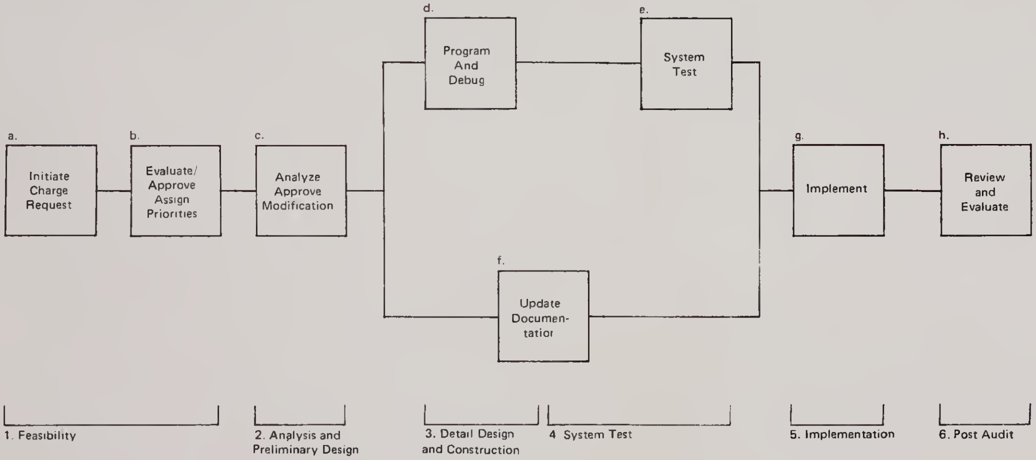


EXHIBIT XII

STATE OF MONTANA
SYSTEM DEVELOPMENT PLANNING CHARTS
PRODUCTION SYSTEM SUPPORT



N SERVICES · LOCAL GOVERNMENT · PUBLIC SAFETY · TRANSPORTATION